*International Journal of Environment and Climate Change*

***Volume 13, Issue 10, Page 4161-4167, 2023; Article no.IJECC.106728***
***ISSN: 2581-8627***
*(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)*

# Effect of Rice Straw Management on Growth Attributes of Potato (*Solanum tuberosum L.*)

**Yugvinder [a*], Lila Bora [a], V. P. S. Panghal [a], Vikas Gill [a] and Naveen Kumar [a,b]**

*[a] Department of Vegetable Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India.*
*[b] Department of Vegetable Science, Maharana Pratap Horticulture University, Karnal, Haryana, India.*

***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

***Article Information***

DOI: 10.9734/IJECC/2023/v13i103092

**Open Peer Review History:**
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/106728

***Original Research Article***

***Received: 12/07/2023***
***Accepted: 17/09/2023***
***Published: 27/09/2023***

## ABSTRACT

India is the second- largest producer of rice in the world, with 43.86 million hectares of land under rice cultivation where the crop residue generated is more than 160 million tons per year. The rice straw management is a challenging task in rice-producing regions. So, there is a need for an effective waste disposal technology for converting this waste into some valuable form. Keeping this in view,the present investigation was undertaken during the winter (*Rabi*) season of 2021-22 and 2022-23 at the Research Farm of the KVK Jagdishpur, Sonipat, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar, Haryana to evaluate the effect of rice straw management on the growth attributes of potato.The seed material of potato*cv.* "KufriKhyati" was grown with twelve different rice straw treatment combinations. The experimental results revealed that the treatment $T_1$ (Removing of straw + Planting) which was at par with treatment $T_9$ (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) performed superiorly over the other treatments with significantly higher values for growth attributes viz., plant emergence (%), plant height (cm), number of stems per hill and number of leaves per hill.

**Corresponding author: E-mail: yugvindergoyat09@gmail.com;*

*Keywords: Potato; rice straw; kufri khyati; waste decomposer; FYM; urea; growth parameters.*

## 1. INTRODUCTION

Potato (*Solanum tuberosum* L.), a perennial herbaceous plant that belongs to the family Solanaceae originated in highland tropics of Andean mountains of Peru and Bolivia in South America, is one of the most important annual herbaceous vegetable crop. The species Solanum tuberosum L. (2n=4x=48), commonly cultivated potato is an autotetraploid which includes two sub-species, viz. ssp. andigena adapted to short days and ssp. tuberosum adapted to long days. It is being grown in more than 150 countries in the world andit has become one of the principal cash crops of India [1].

This important crop is capable enough to meet the food requirements of our country in a substantial way as it produces more dry-matter, more calories and balanced protein per unit area of land and time than other food crops. Potato supplies about two and half times more calories as compared to wheat and rice and hence the crop produces the highest yield of energy and protein per hectare. It is also a major food security vegetable crop with 20.6% carbohydrates, 2.1% protein, 0.3% fat, 1.1% crude fiber and 0.9% ash and good amount of essential amino acids like leucine, isoleucine and tryptophane [2].

Agriculture waste is produced by various agricultural operations, and it contains sugarcane bagasse, paddy and wheat straw and husk, waste of vegetables, food products, jute fibers, crop stalks etc. Amongst the different lingo-cellulosic crop residues in India, rice straw constitutes the largest proportion, with a production of 112 million metric tons per annum [3]. Around 7.95 million metric tons of paddy crop residue generated in Haryana in the year 2020. From the total paddy straw generated around 1.36 million metric tons was burnt which is responsible for the various environmental contamination [4]. The abundance of agricultural waste production causes lot of environmental contamination problems. Microbial decomposition enhances nutrient content by nitrogen fixing, phosphorous solublization and cellulose decomposition of decomposed final product. There are a variety of bio-decomposers such as bacteria, fungi, protozoa, etc. and they are capable to degrade cellulose by depolymerizing celluloses which hydrolyze ligno-celluloses [5]. Therefore, the rice straw management practices could be a rational approach in order to cultivate crops like potato sustainably and efficiently handling the crop residues.

## 2. MATERIALS AND METHODS

The experiment was carried out at the Research Farm of the KVK Jagdishpur, Sonipat, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar, Haryana during winter (*Rabi*) season of the year 2021-22 and 2022-23.The soil of the experimental field was non-saline, sandy loam in texture, medium in organic carbon, medium in available nitrogen, high in available phosphorus and rich in available potassium.The experiment was conducted in Randomized Block Design (RBD) having 12 treatments -T1.Removing of straw + Planting (Control), T2.Mixing of chopped straw + Planting, T3. Urea @ 50 kg/ha + Mixing of chopped straw + Planting, T4.Urea (4%) spray + Mixing of chopped straw + Planting, T5.Waste decomposer (25 lt/ha) + Mixing of chopped straw + Planting, T6.FYM (1 ton/ha) + Mixing of chopped straw + Planting, T7.Urea (50 kg/ha) + Waste decomposer (25 lt/ha) + Mixing of chopped straw + planting, T8.Urea (50 kg/ha) + FYM (1 ton/ha) + Mixing of chopped straw + planting, T9.Urea (50 kg/ha) + Waste decomposer (25 lt/ha) + FYM (1 ton/ha) + Mixing of chopped straw + Planting, T10.Urea (4%) spray + Waste decomposer (25 lt/ha) + Mixing of chopped straw + Planting, T11.Urea (4%) spray + FYM (1 ton/ha) + Mixing of chopped straw + planting,T12.Urea (4%) spray + Waste decomposer (25 lt/ha) + FYM (1 ton/ha) + Mixing of chopped straw + Planting,with three replications.Seed material comprised of an early maturing potato variety developed at Central potato Research Institute i.e Kufri Khyati, the tubers were planted with a spacing of 60 cm x 20 cm in different plots of size 4.8 m × 3.0 m. The recommended dose of fertilizers for the state is 150kg/ha nitrogen, 50kg/ha phosphorus and 100kg/ha potassium. Growth attributes *viz.*plant emergence (%) was recorded at 30 days after planting, Plant height was recorded at 45, 60, 75 and 90 days after planting (cm), number of stems per hill and number of leaves per hillwere recorded at the time of harvesting.

### 2.1 Statistical Analysis of Data

The data obtained from experiment conducted in RBD was analyzed as per standard method

suggested by Panse and Sukhatme [6]. The critical difference (CD) values were calculated at 5 per cent probability level whenever 'F' test was significant.

The standard error of differences (SEd), Standard error of means (SEm), Critical difference (CD) and coefficient of variation (CV) were calculated as follow:

$$SE(m) = \sqrt{\frac{EMS}{r}}$$

$$SE(d) = \sqrt{2\left(\frac{EMS}{r}\right)}$$

$$CD(5\%) = SEd \times t \text{ value at error d.f.}$$

$$CV(\%) = \frac{\sqrt{EMS}}{\bar{X}} \times 100$$

Where,

r = number of replication
$\bar{X}$ = overall mean (grand total /n)

## 3. RESULTS AND DISCUSSION

### 3.1 Growth Attributes

The perusal of data related to growth attributes ofpotato presented in Table 1 depicts that varioustreatments of rice straw management have significantly influenced all the growth attributes *viz.*plant emergence (%), plant height (cm), number of stems per hill and number of leaves per hill.

#### 3.1.1 Plant emergence

The effect of different rice straw management practices on the plant emergence of potato was nonsignificant. However, the plant emergence was maximum (88.74) with treatment $T_1$ where rice straw was removed and planting was done which is followed by $T_7$ (Urea + WD + Mix + planting) (87.16) and $T_9$ (Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting) (86.99) while the minimum was recorded with treatment $T_2$(Mixing of chopped straw +Planting) (82.68).

#### 3.1.2 Plant height (cm) at 45, 60, 75 and 90 days after planting

The data revealed that the various rice straw management practices have influenced the plant height in and it was observed that the plant height at 45 days after planting was maximum with treatment $T_1$ (36.98) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (35.63) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting)and $T_7$ (35.08) (Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting) whereas the minimum pooled value (29.09) was recorded with the treatment $T_2$ (Mixing of chopped straw +Planting). Plant height at 60 DAP was maximum with treatment $T_1$ (39.77) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (38.31) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) and $T_7$(37.72) (Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting) whereas the minimum pooled value (31.28) was recorded with the treatment $T_2$ (Mixing of chopped straw +Planting). Plant height at 75 DAP was also significantly maximum with treatment $T_1$ (43.27) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (41.69) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) and $T_7$(41.05) (Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting) whereas the minimum pooled value (34.08) was recorded with the treatment $T_2$ (Mixing of chopped straw +Planting). Plant height at 90 DAP was recorded significantly maximum with treatment $T_1$ (45.26) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (43) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) and $T_7$ (42.93) (Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting) whereas the minimum pooled value (35.64) was recorded with the treatment $T_2$ (Mixing of chopped straw +Planting).

#### 3.1.3 Number of stems per hill at harvest

The similar trend was observed in thenumber of stems per hill as they was recorded significantly maximum with treatment $T_1$ (4.81) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (4.65) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) whereas the treatment $T_2$ (Mixing of chopped straw +Planting) recorded the minimum (3.45) number of stems per hill.

**Table 1. Effect of rice straw management on plant emergence at 30 DAP**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 88.16 | 89.32 | 88.74 |
| $T_2$ | Mixing of chopped straw +Planting | 82.13 | 83.22 | 82.68 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 85.31 | 86.44 | 85.87 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 83.55 | 84.65 | 84.10 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 85.44 | 86.57 | 86.01 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 83.29 | 84.39 | 83.84 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 86.59 | 87.73 | 87.16 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 85.84 | 86.97 | 86.41 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 86.43 | 87.56 | 86.99 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 83.91 | 85.02 | 84.46 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 84.67 | 85.78 | 85.23 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 84.34 | 85.45 | 84.89 |
| CD at 5 % | | NS | NS | NS |

**Table 2. Effect of rice straw management on plant height (cm) at 45 DAP**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 36.61 | 37.36 | 36.98 |
| $T_2$ | Mixing of chopped straw +Planting | 28.80 | 29.39 | 29.09 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 33.33 | 34.01 | 33.67 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 29.77 | 30.38 | 30.08 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 31.44 | 32.09 | 31.76 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 29.92 | 30.54 | 30.23 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 34.72 | 35.43 | 35.08 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 32.57 | 33.23 | 32.90 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 35.27 | 35.99 | 35.63 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 31.17 | 31.81 | 31.49 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 30.50 | 31.12 | 30.81 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 31.69 | 32.33 | 32.01 |
| CD at 5 % | | 2.09 | 2.14 | 2.03 |

**Table 3. Effect of rice straw management on plant height (cm) at 60 DAP**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 39.36 | 40.17 | 39.77 |
| $T_2$ | Mixing of chopped straw +Planting | 30.97 | 31.60 | 31.28 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 34.07 | 34.77 | 34.42 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 32.01 | 32.67 | 32.34 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 33.81 | 34.50 | 34.16 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 32.18 | 32.83 | 32.51 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 37.34 | 38.10 | 37.72 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 35.02 | 35.73 | 35.38 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 37.93 | 38.70 | 38.31 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 33.52 | 34.20 | 33.86 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 32.80 | 33.47 | 33.13 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 35.84 | 36.57 | 36.20 |
| CD at 5 % | | 2.25 | 2.28 | 2.14 |

**Table 4. Effect of rice straw management on plant height (cm) at 75 DAP**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 42.16 | 44.38 | 43.27 |
| $T_2$ | Mixing of chopped straw +Planting | 33.20 | 34.95 | 34.08 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 38.39 | 40.41 | 39.40 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 34.29 | 36.10 | 35.19 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 36.22 | 38.12 | 37.17 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 34.47 | 36.28 | 35.37 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 40.00 | 42.10 | 41.05 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 37.51 | 39.49 | 38.50 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 40.63 | 42.76 | 41.69 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 35.90 | 37.79 | 36.85 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 35.13 | 36.98 | 36.06 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 36.50 | 38.42 | 37.46 |
| CD at 5 % | | 2.41 | 2.51 | 2.47 |

**Table 5. Effect of rice straw management on plant height (cm) at 90 DAP**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 44.80 | 45.72 | 45.26 |
| $T_2$ | Mixing of chopped straw +Planting | 35.28 | 36.00 | 35.64 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 40.79 | 41.62 | 41.20 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 36.44 | 37.18 | 36.81 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 38.48 | 39.27 | 38.87 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 36.62 | 37.37 | 37.00 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 42.50 | 43.36 | 42.93 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 39.86 | 40.67 | 40.26 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 42.17 | 44.05 | 43.00 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 38.15 | 38.92 | 38.54 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 37.33 | 38.09 | 37.71 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 38.78 | 39.57 | 39.17 |
| CD at 5 % | | 2.51 | 2.59 | 2.46 |

**Table 6. Effect of rice straw management on number of stems per hill**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 4.69 | 4.93 | 4.81 |
| $T_2$ | Mixing of chopped straw +Planting | 3.36 | 3.53 | 3.45 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 3.77 | 3.97 | 3.87 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 3.61 | 3.80 | 3.71 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 3.74 | 3.93 | 3.84 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 3.55 | 3.73 | 3.64 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 4.37 | 4.60 | 4.49 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 3.99 | 4.20 | 4.10 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 4.53 | 4.77 | 4.65 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 3.67 | 3.87 | 3.77 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 3.64 | 3.83 | 3.74 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 3.99 | 4.20 | 4.10 |
| CD at 5 % | | 0.16 | 0.20 | 0.25 |

**Table 7. Effect of rice straw management on number of leaves per hill**

| Treatments | | 2021-22 | 2022-23 | Pooled |
|---|---|---|---|---|
| $T_1$ | Removing of straw + Planting | 45.51 | 47.90 | 46.70 |
| $T_2$ | Mixing of chopped straw +Planting | 37.30 | 39.27 | 38.29 |
| $T_3$ | Urea (50kg/ha) + Mixing of chopped straw + Planting | 39.17 | 41.23 | 40.20 |
| $T_4$ | Urea (4%) spray + Mixing of chopped straw + Planting | 37.91 | 39.90 | 38.90 |
| $T_5$ | WD (25lt/ha) + Mixing of chopped straw + Planting | 39.74 | 41.83 | 40.79 |
| $T_6$ | FYM (1ton/ha) + Mixing of chopped straw + Planting | 37.94 | 39.93 | 38.94 |
| $T_7$ | Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting | 43.64 | 45.93 | 44.79 |
| $T_8$ | Urea (50kg/ha) + FYM (1ton/ha) + Mixing of chopped straw + planting | 40.53 | 42.67 | 41.60 |
| $T_9$ | Urea (50kg/ha) + WD (25lt/ha) + FYM(1ton/ha) + Mixing of chopped straw + Planting | 43.89 | 46.20 | 45.05 |
| $T_{10}$ | Urea (4%) spray + WD (25lt/ha) + Mixing of chopped straw + Planting | 38.76 | 40.80 | 39.78 |
| $T_{11}$ | Urea (4%) spray + FYM (1ton/ha) + Mixing of chopped straw + planting | 38.92 | 40.97 | 39.94 |
| $T_{12}$ | Urea (4%) spray + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting | 41.45 | 43.63 | 42.54 |
| CD at 5 % | | 1.96 | 2.27 | 2.00 |

### 3.1.4 Number of leaves per hill at harvest

Number of leaves per hill were recorded significantly maximum with treatment $T_1$ (46.70) (removing of rice straw + planting) which was at par with the values of treatment $T_9$ (45.05) (Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting) and treatment$T_7$ (44.79) (Urea (50kg/ha) + WD (25lt/ha) + Mixing of chopped straw + planting) whereas the treatment $T_2$ (Mixing of chopped straw +Planting) recorded the minimum (38.29) number of leaves per hill.

The results associated with the growth attributes that is plant emergence (%), plant height (cm), number of stems per hill and number of leaves per hill indicated that there was a significant and positive effect of different rice straw treatment combinations of organic and inorganic nutrient sources on the plant height, number of stems per hill and number of leaves per hill. The statistical analysis showed that effect of rice straw management on plant emergence at 30 DAP was not significant. The reason behind is evident that well sprouted healthy seed tubers were planted, which provided favorable condition for emergence [7]. The results of the present investigation are in agreement with the findings of Barman et al. [8]**.** Plant height recorded at 45, 60, 75 and 90 days after planting, showed significant differences among the different treatments of rice straw management. The results led to the conclusion that the application of additional nitrogen through urea and FYM along with the Pusa waste decomposer led to the proper decomposition of the rice straw and hence resulting in the increased plant height. The results of the present investigation are in line with the findings of Zhang et al. [9] who also observed that the *In situ* incorporation of rice straw influenced the wheat crop yield and yield attributes. The findings of present study are supported by the findings of Singh et al*.* [10]. Similarly, the effect of rice straw management on number of stems and leaves per hill was significantly positive and various combinations of nutrient sources reportedly increased the number of stem and leaves per hill. The results of the present investigation are in agreement with the findings of Manu et al*.* (2022) and Yadav et al*.* [11]. This indicates that the increase in the growth attributes of the potato plant may be due to the combined action of waste decomposer and additional nitrogen on the decomposition of rice straw which is responsible for the increased values of different growth parameters. It seems quite clear that growth parameters respond to additional nitrogen along with the waste decomposer [12].

## 4. CONCLUSION

On the basis of present study it may be concluded the application of organic as well as inorganic nitrogen source along with the waste decomposer has a significant and vital effect on growth attributes of potato crop. Therefore, the implicit management of rice straw for getting increased values of growth parameters can be achieved by the application of Urea (50kg/ha) + WD (25lt/ha) + FYM (1ton/ha) + Mixing of chopped straw + Planting as per treatment $T_9$.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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